

Q1. State the main components of robot.

1. _____
2. _____
3. _____
4. _____
5. _____

Answer

- 1- Microcontroller
- 2- Sensors
- 3- Motors or Actuators
- 4- Other Components
- 5- Software Component

Q2. What is LEGO MINDSTORMs NXT?

Answer

It is a Programmable Robotic kit, the one you will be using to build up your own robot and program it in order to perform a task.

Q3. What are the applications of robot (state five)?

- 1) _____
- 2) _____
- 3) _____
- 4) _____
- 5) _____

Answer

- 1- Rotate
- 2- Convey
- 3- Walk
- 4- Swim
- 5- Fly

Q4. State the main components of LEGO MINDSTORMs NXT?

- 1- _____
- 2- _____
- 3- _____
- 4- _____

ANSWER

1. NXT Brick.
2. Sensors:
3. Motors.
4. Other components like gears, axels and wheels.

Q5. What do you mean by Robotics?

Sense: collect information about the environment using its sensors,

Plan: the robot will be able to make decision, like our minds

Act: making a decision generates an action done by the robot;

Q6. What is the function of the following LEGO MINDSTORMs NXT components?

components	functions
1- Touch sensor	
2- Sound sensor	
3- Light sensor	
4- Ultrasonic sensor	
5- Interactive servo motors	

Answer.

components	functions
6- Touch sensor	Enable the robot to respond to obstacles in the environment.
7- Sound sensor	Enables the robot to respond to sound levels.
8- Light sensor	Enables the robot to respond to variations in light level and color.
9- Ultrasonic sensor	Enables the robot to measure distance to an object and to respond to movement.
10- Interactive servo motors	Ensure that robots move smoothly and precisely

Q7. State the NXT brick main menus.

- 1- -----
- 2- -----
- 3- -----
- 4- -----
- 5- -----
- 6- -----

Answer

1. My files
2. NXT Program
3. Try Me
4. View
5. Settings
6. Bluetooth

Q8. Choose the correct answers. (Put your answer in the table)




- 1- Sensors are used as----- for the robot (inputs – oil – electricity)
- 2- Motor are the -----of the robot where the action is applied (Expensive – outputs– self lubrication)
- 3- The input port of LEGO MINDSTORMs NXT (4 , 6 , 2)
- 4- The output port of LEGO MINDSTORMs NXT (4 , 3 , 2)

Question	1	2	3	4
Answer				




Answer.

Question	1	2	3	4
Answer	inputs	outputs	4	3

Q9. To Open My Files submenu click the orange button of the NXT Brick, the following subfolders will appear write the function of these icons shown:

subfolders	Function
Software Files 	
NXT Files 	
Sound Files 	

Answer.

subfolders	Function
Software Files 	Programs you have downloaded from your computer.
NXT Files 	Programs you have made on the NXT.
Sound Files 	Sounds that are part of a program that you download.

Q10. What is the use of sound sensor?

Answer.

The sound sensor can measure sound levels up to 90 dB

Q11. What is the difference between the readings in dB and dBA?

Answer.

dBA: in detecting adjusted decibels , the sensitivity of the sensor is adapted to the sensitivity of the human ear.

dB: in detecting stander decibels , all sounds are measured with equal sensitivity

Q12. What is the use of the light sensor?

Answer.

It can read the light intensity in a room and measure the light intensity of colored surfaces

Q13. What is the light sensor used for?

Answer.

It Used to make a burglar alarm robot and to make a line-following robot or sorting things by color

Q14. What does the ultrasonic sensor measures, what is the unit?

Answer

To measure distance in centimeters and in inches on the NXT

Q15. What is the function of the following subfolders of settings Submenu of NXT?

- ❖ Sleep Mode -----
- ❖ Change Volume -----
- ❖ Delete all programs -----

Answer

- ❖ Sleep Mode:-
You can set your NXT to be turned off after 2, 5, 10, 30 or 60 minutes when it is not being used.
- ❖ Change Volume:-
Here you can adjust the volume of the NXT speakers in a range of 0 (Off) to 4 (Loud).
- ❖ Delete all programs:-
You are able to delete the programs from four subfolders: Software files, NXT files, Sound files, and Try Me files.

Q16. What is the use of light sensor?

Answer.

Enable the robot to see and detect objects you can also use it to make your robot avoid obstacles

Q17. What is the function of motors?

Answer

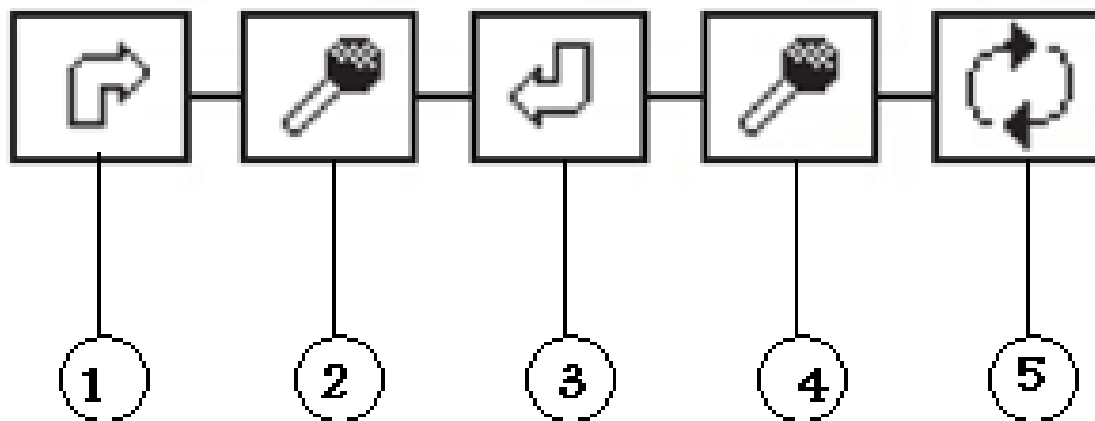
This lets you control your robot's movements precisely

Q18. What is the function of Bluetooth?

Answer.

Bluetooth is a technology that it possible to send and receive data without using wires or cables

Q19. Write the name of each symbol in the drawing

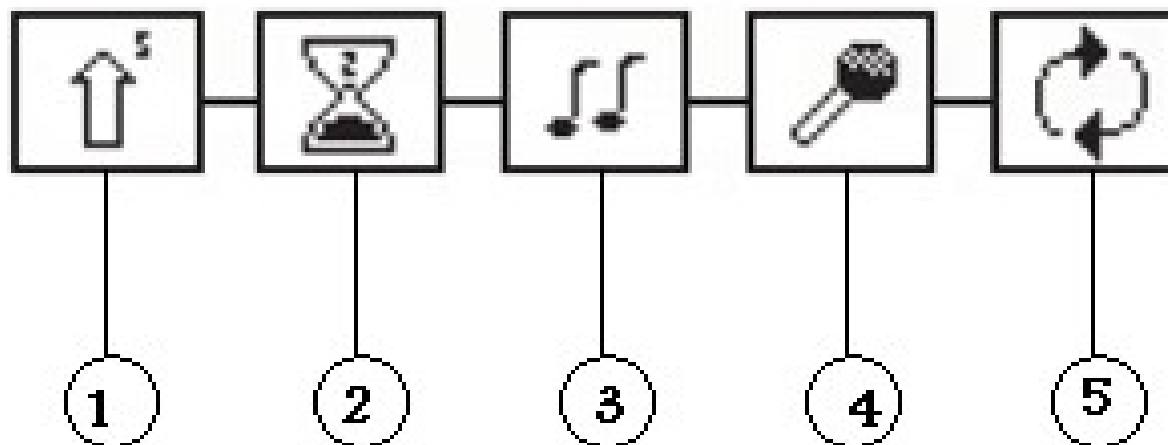


1-
2-
3-
4-
5-

Answer

1. Turn right
2. Sound
3. Back left
4. Sound
5. loop

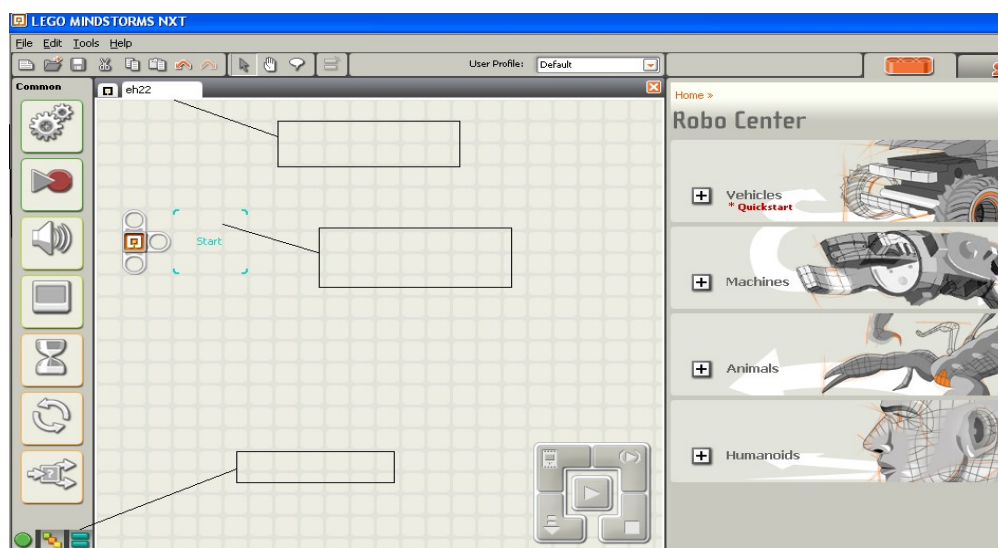
Q20. Write the name of each symbol in the drawing



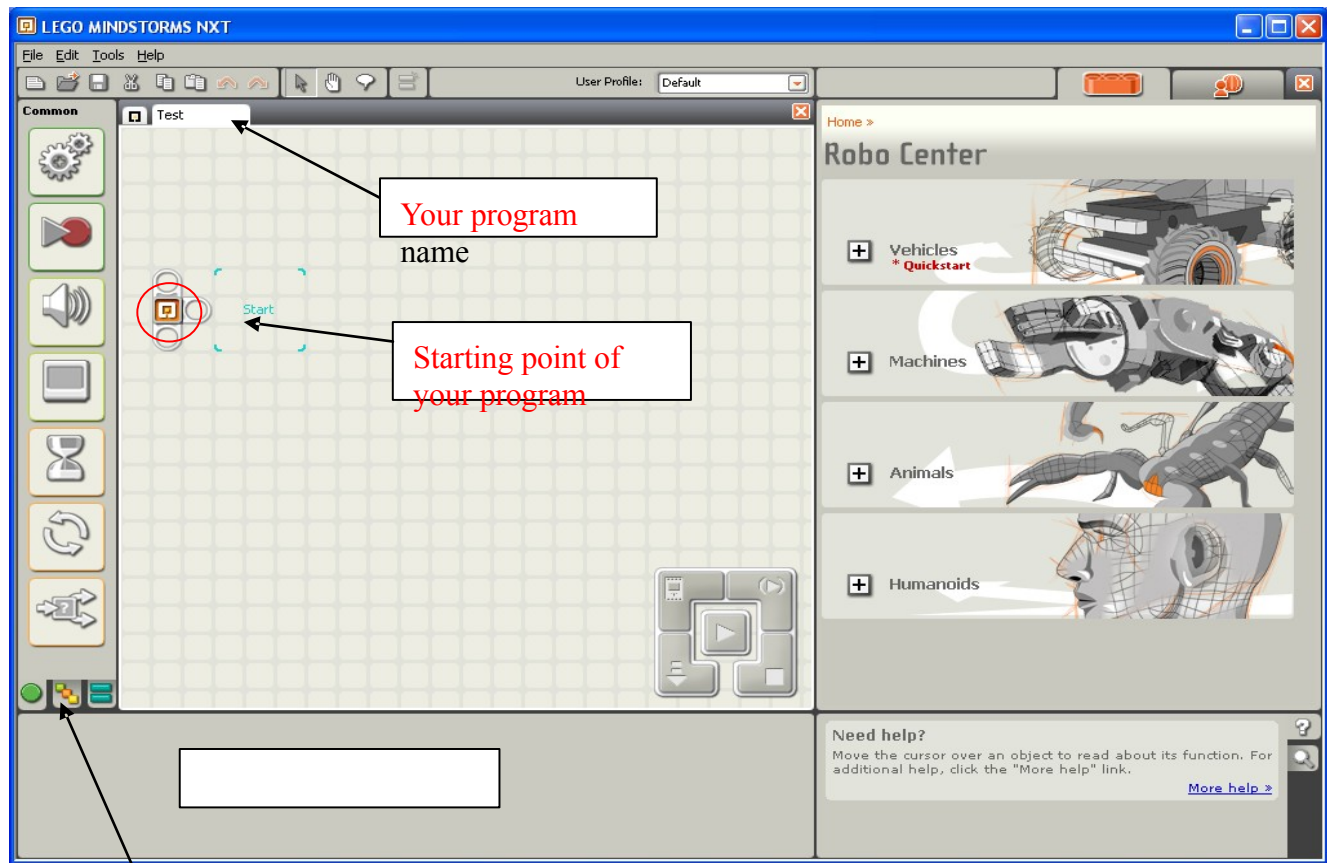
Answer.

1. Forward 5
2. Wait 2
3. Tone
4. Sound
5. loop

Q21. Name the icons shown in the following window (write in the rectangle attached)



Answer

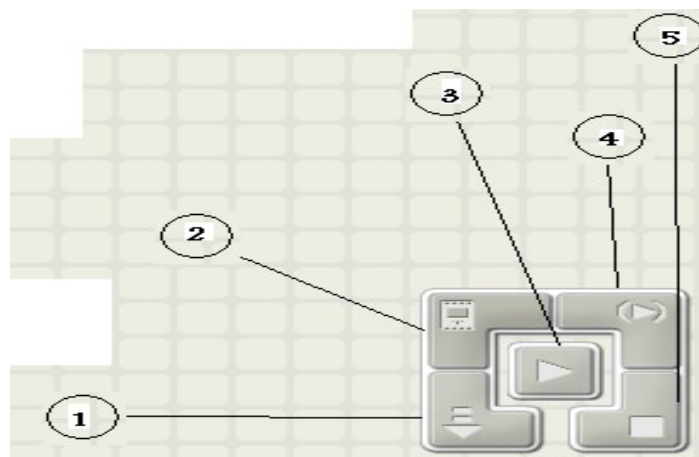


Palette

s

Q22. Name the buttons of NXT on the drawing shown?

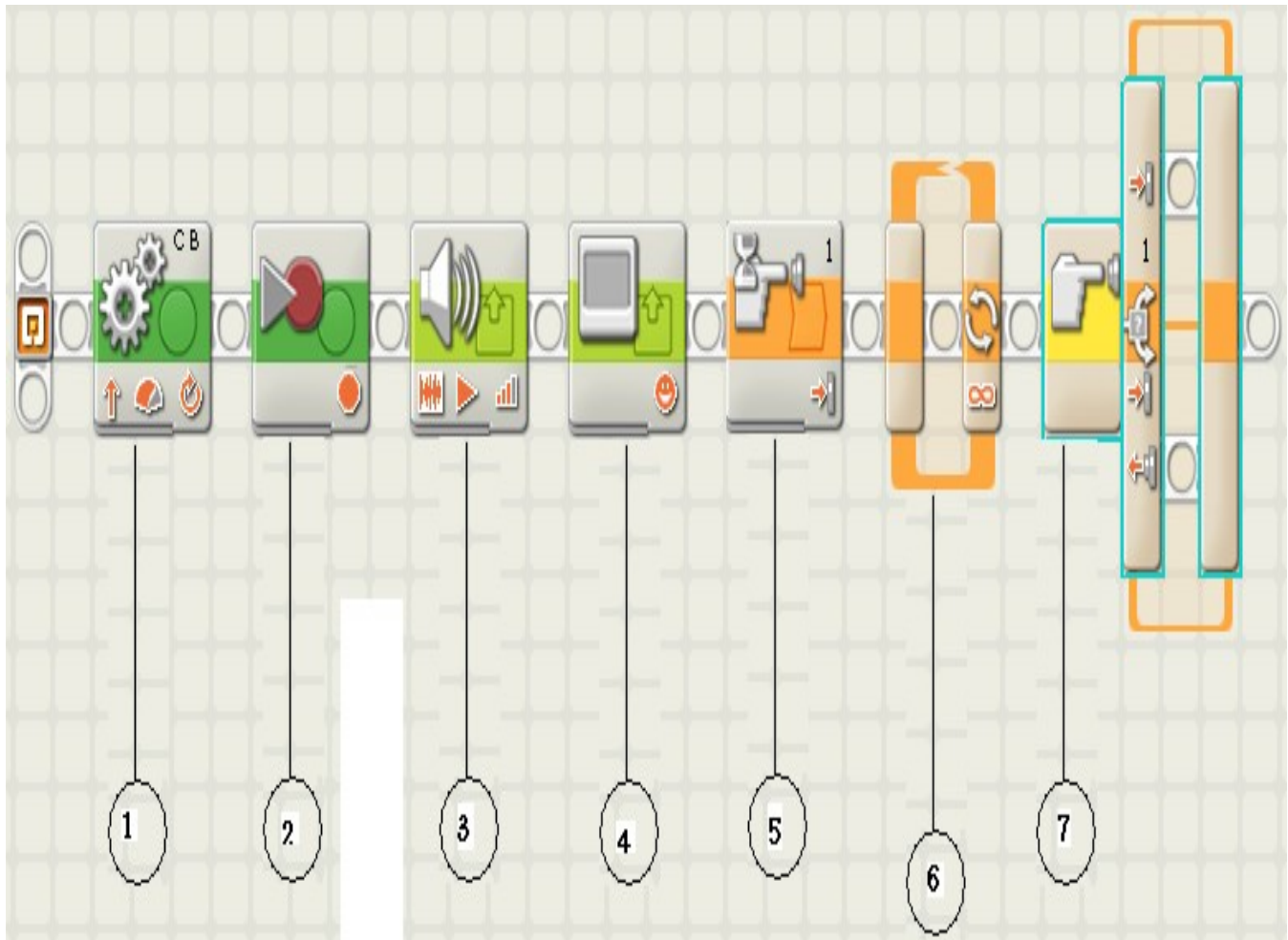
- 1-----
- 2-----
- 3-----
- 4-----
- 5-----



Answer

1. The Download button downloads the program to the NXT. You can then run the program from the NXT.
2. The NXT window button gives you access to the NXT memory and communication settings.
3. The Download and run button downloads a program to the NXT and then starts running the program.
4. The Download and run selected button downloads and runs just a pieces of your program code.
5. The Stop button stops a running program.

Q23. Name the NXT blocks on the drawing shown

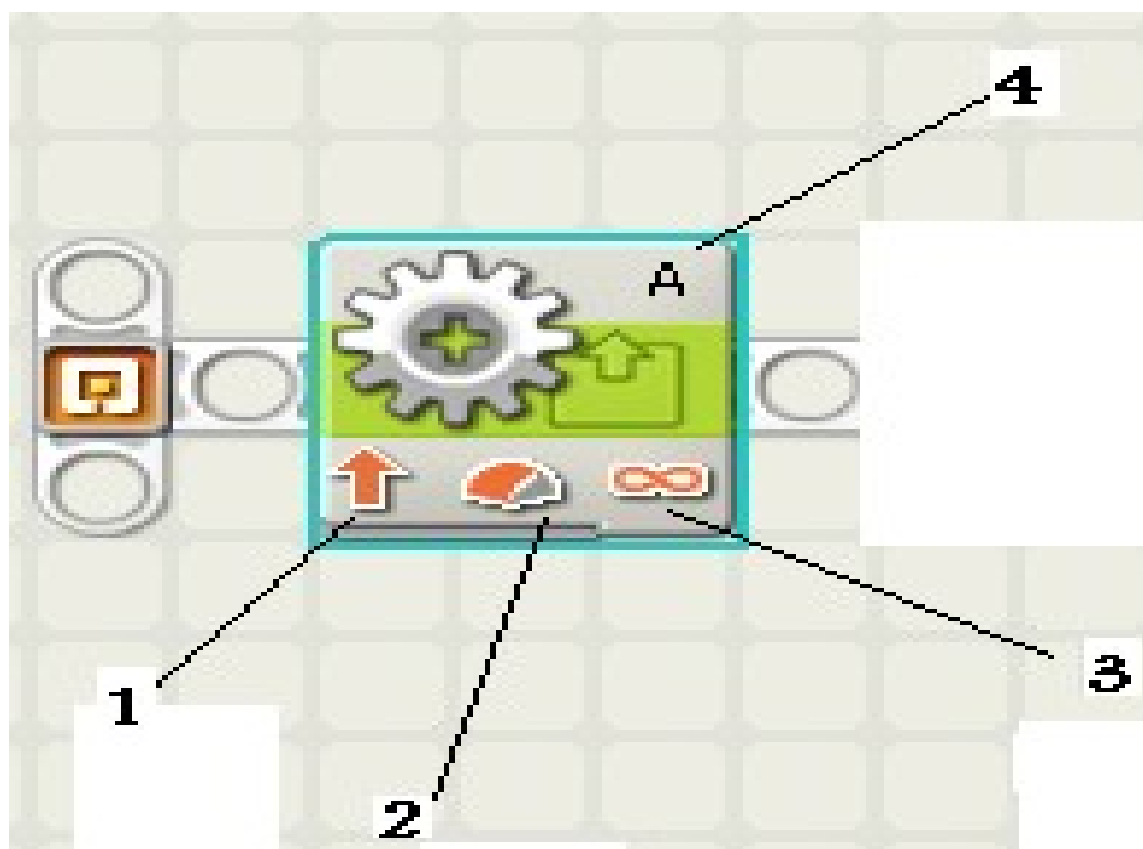


- 1-----
- 2-----
- 3-----
- 4-----
- 5-----
- 6-----
- 7-----

Answer

1. Move block
2. Record/play block
3. Sound
4. Display
5. Touch sensor
6. Loop block
7. Switch

Q24. Name the symbols on the Motor block shown?

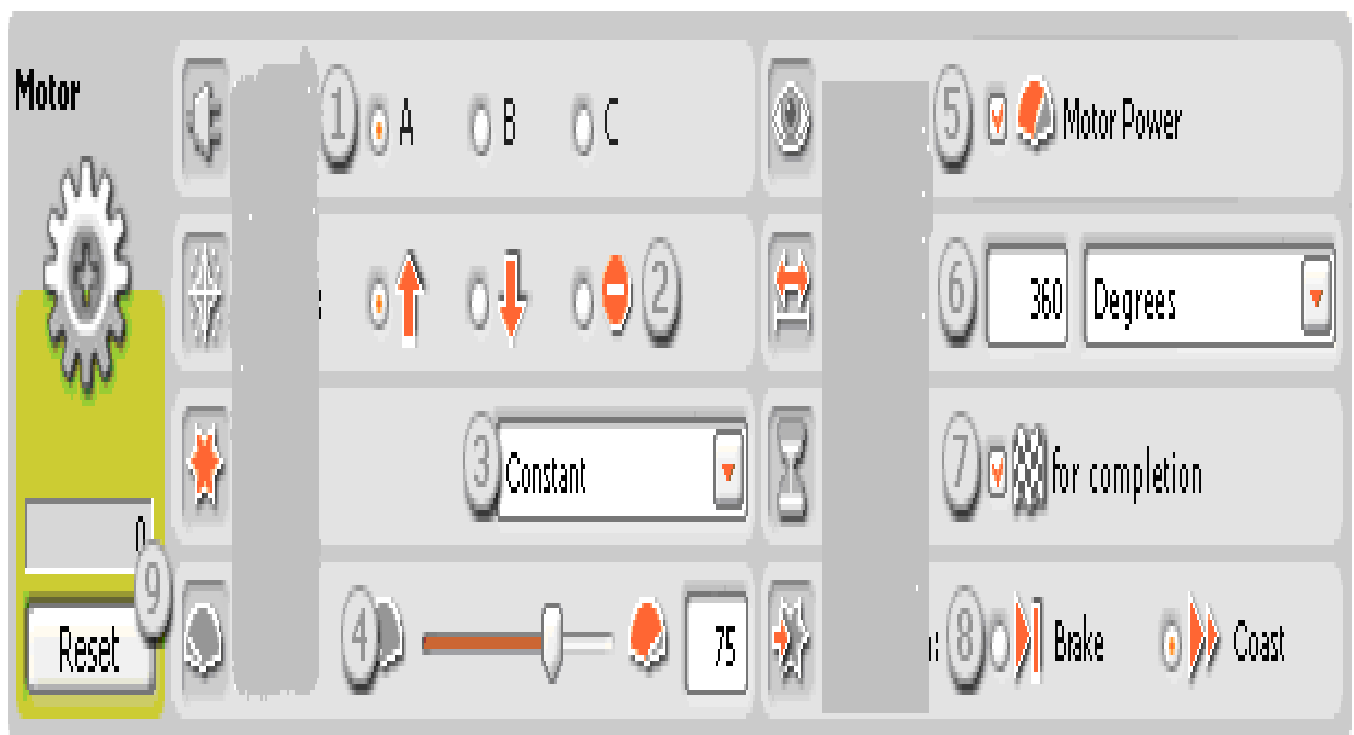


- 1-----
- 2-----
- 3-----
- 4-----

Answer

1. This icon shows which direction the motor will go.
2. This icon shows the power level (speed).
3. This icon shows whether you have set the duration property to unlimited, degrees, rotations or seconds.
4. The Letter at the top right corner of the block shows which NXT port is set to control a motor.

Q25. Name the symbols on configuration of the motor block shown?



Answer

1. Port:
2. Direction:
3. Action: Power:
4. Control:
5. Duration:
6. Wait:
7. action
8. Next Action:
9. The feedback boxes will count how many degrees or full rotations your motor turns.

Q26. What is the function of LEGO MINDSTORMs NXT software?

Answer.

The program that you will be using to create your own program using a computer and then download it in to the NXT brick (your robot mind)

Q27. Defines the sensors using with the robot?

Answer:-

Sensors are the robot senses which help the robot to sense the environment. Sensors could be defined as an electronic device used to measure a physical quantity

Sensors are the inputs of the Microcontroller

Q28. Fill in the blank, choose from the following bracket (Electronic, electronic signal, three, Sense, reading.) put the answer in the table attached.

1. Sensors are the robot senses which help the robot to ----- the environment where actions and tasks of the robot depend on the -----of its sensors.
2. Sensors could be defined as an ----- device used to measure a physical quantity such as temperature, pressure or loudness and convert it into an ----





3. Lego MINDSTORMs NXT has----- palettes with icons used in programming.

Question	1	2	3
Answer			





Answer:-

Question	1	2	3
Answer	Sense, reading	Electronic, electronic signal.	three

Q29. Write the name of the following pictures and their functions in the table below.

Sensor	Sensor Name	Main task or function
		
		
		
		

Answer:-









Sensor	Sensor Name	Main task or function
	Touch Sensor	Enable the robot to respond to obstacles in the environment.
	Sound Sensor	Enables the robot to respond to sound levels.
	Light Sensor	Enables the robot to respond to variations in light level and color.
	Ultrasonic Sensor	Enables the robot to measure distance to an object and to respond to movement.

Q30. State the type of MINDSTORMs NXT palettes?









Answer:-

-  Common Palette
-  Complete Palette
-  Custom Palette





Q31. Write down the names of the following Sensor Block in the table below.



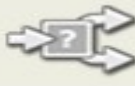

Answer:-

							
Touch Sensor	Sound Sensor	Light Sensor	Ultrasonic Sensor	NXT Buttons	Rotation Sensors	Timer	Receive message

Q32. Write down the names of the following flow Block in the table below.

Answer:-

			
Wait	Loop	Switch	Stop

Q33. Write the touch sensor's condition at a specific point in the program.



- 1- _____
- 2- _____
- 3- _____

Answer:-

1. MINDSTORMs NXT's ports are connected to the touch sensor
2. Action (Bumped, Pressed, or Released).
3. data hub

Q34. At which action in the touch sensor you need to click the reset button?

Answer:-

At Bumped action

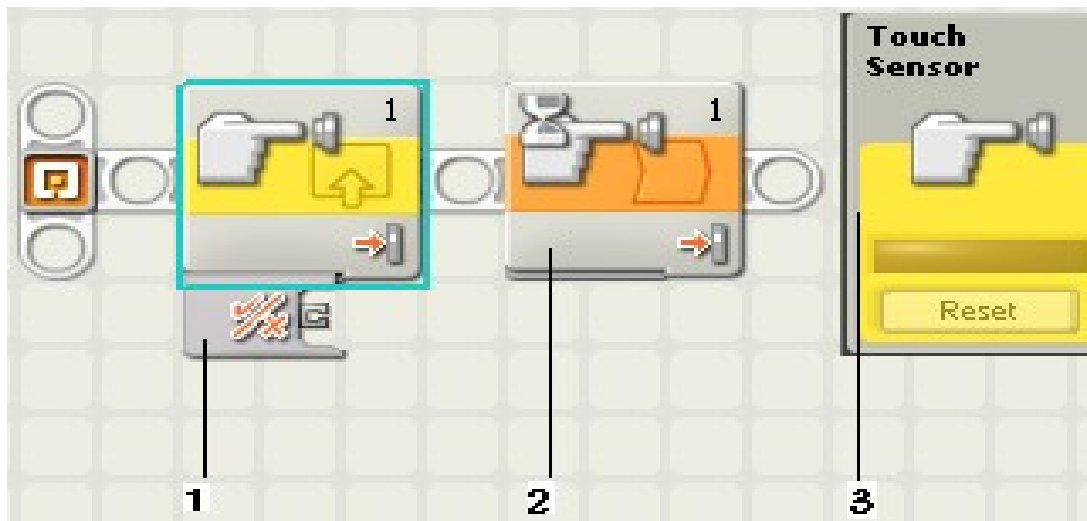
Q35. State the three blocks that touch sensor used as a condition?

1. _____
2. _____
3. _____

Answer:-

- 1- Wait Block
- 2- Loop Block
- 3- Switch Block

Q36. Write down the names of three blocks in the drawing shown



1. _____
2. _____
3. _____

Answer:-

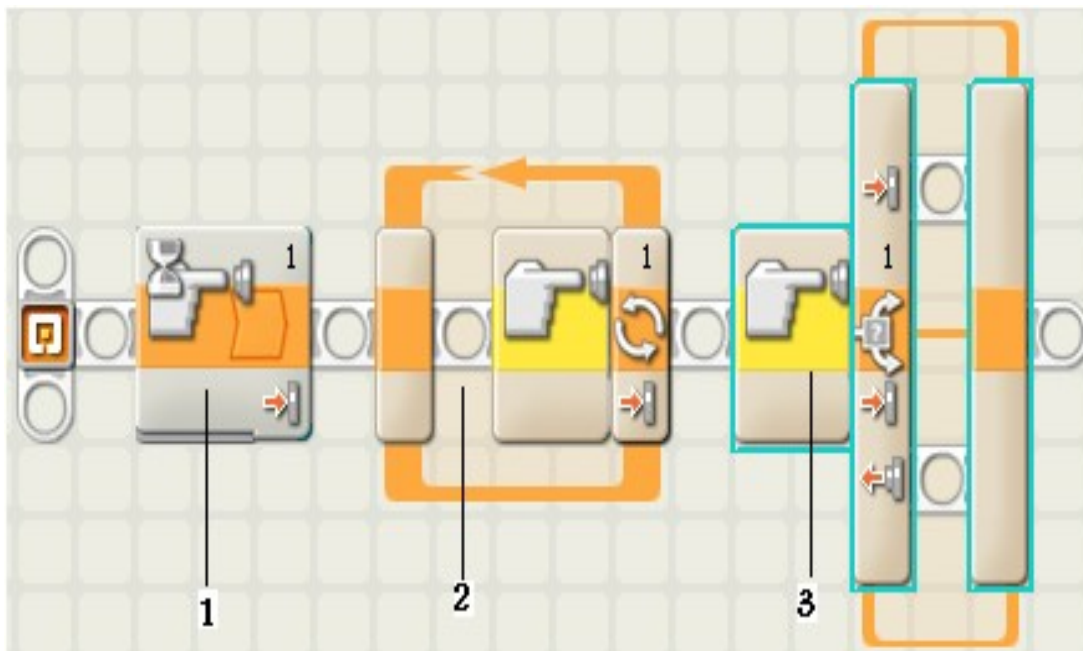
- 1- touch sensor block
- 2- wait block – touch sensor
- 3- feedback box- touch sensor

Q37. Explain the function of the three actions in touch sensor (pressed – released – bumped).

Answer:-

Pressed: - if you want the block to be triggered at the instant the touch sensor is pressed in
 Released: - if you want the block to be triggered at the instant the touch sensor is released
 Bumped: - if you want the block to be triggered after a quick press and release of the touch sensor (less than 0.5 seconds in duration)

Q38. What is the difference between the three blocks shown (brief answer)

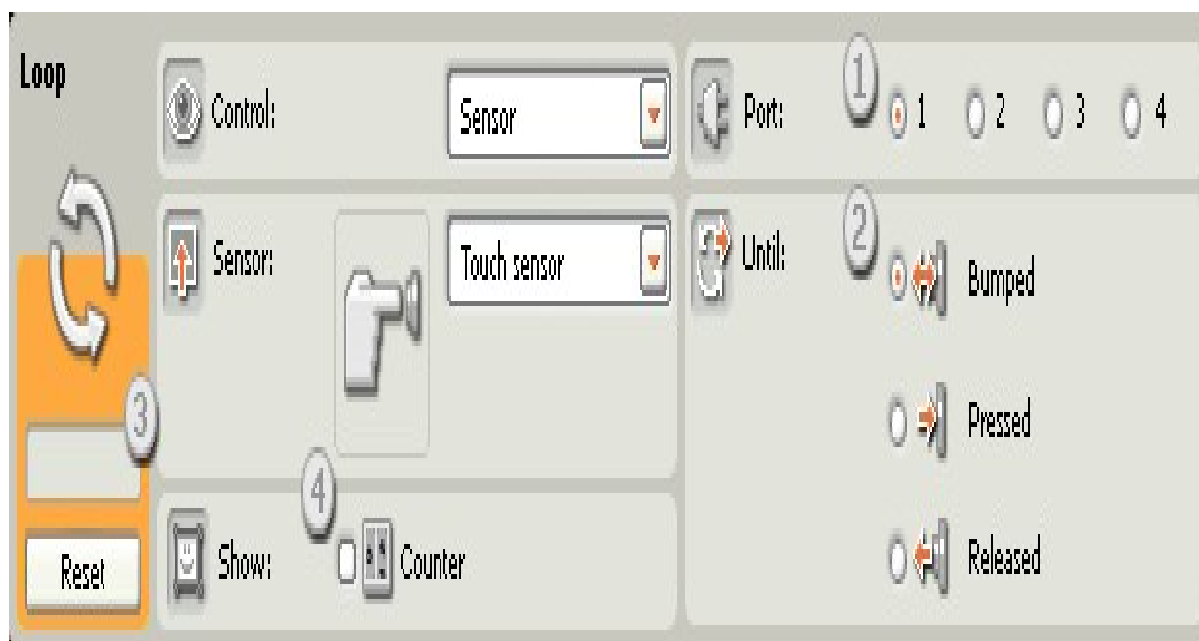


- 1- _____
 2- _____
 3- _____

Answer:-

1. wait for an action of touch sensor reading to perform a task
2. Repeats a code sequence based on a condition of touch sensor.
3. Chooses between the code sequences based on a value of touch sensor.

Q39. For the Configuring Loop - Touch Sensor Block write down the names of the following:-



1. _____
2. _____
3. _____
4. _____

Answer:-

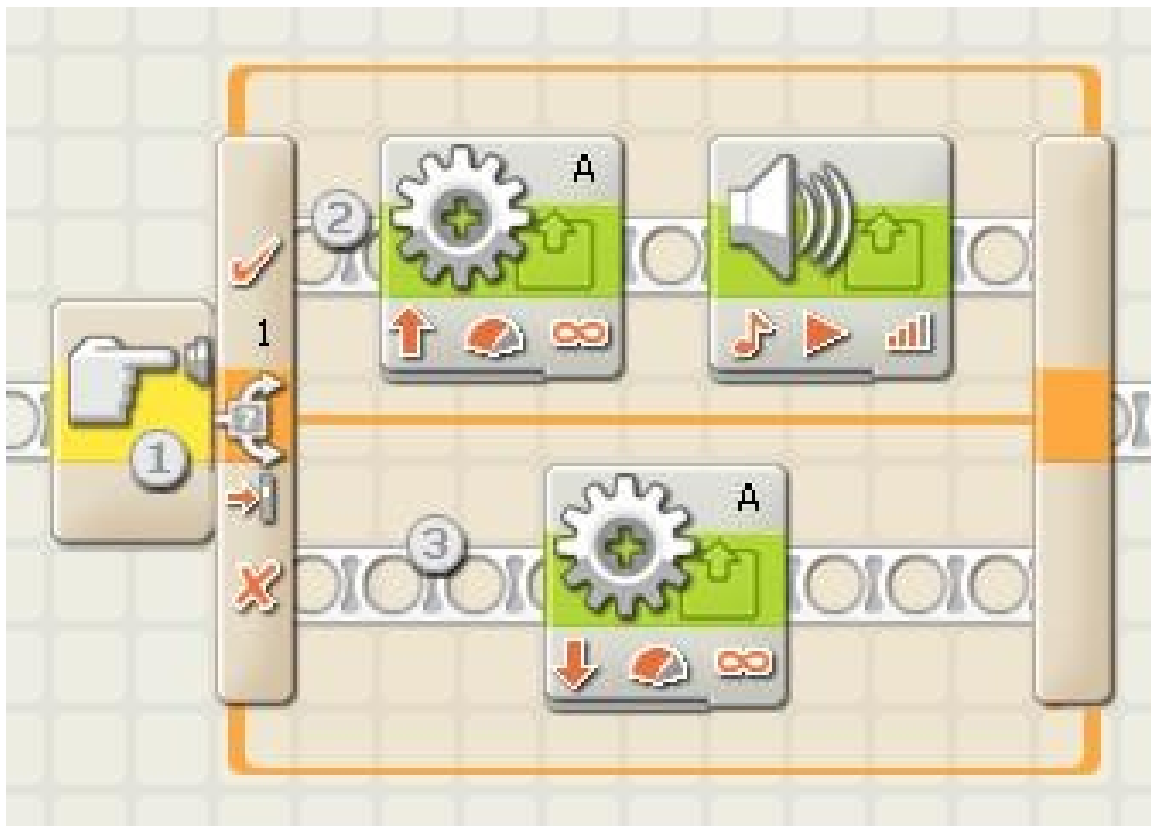
- 1- the port:- that the touch sensor is connected to
- 2- Action: - (Bumped, Pressed, or Released).
- 3- The feedback box: - will let you test your touch sensor.
- 4- "Show Counter" :- checkbox is selected in the configuration panel

Q40. Give some examples of touch sensor application.

Answer:-

Help the robot to sense the obstacles in the environment.

Q41. In The figure below a switch block based on a touch sensor control the motor motion. Explain briefly what the function of each block in the program.

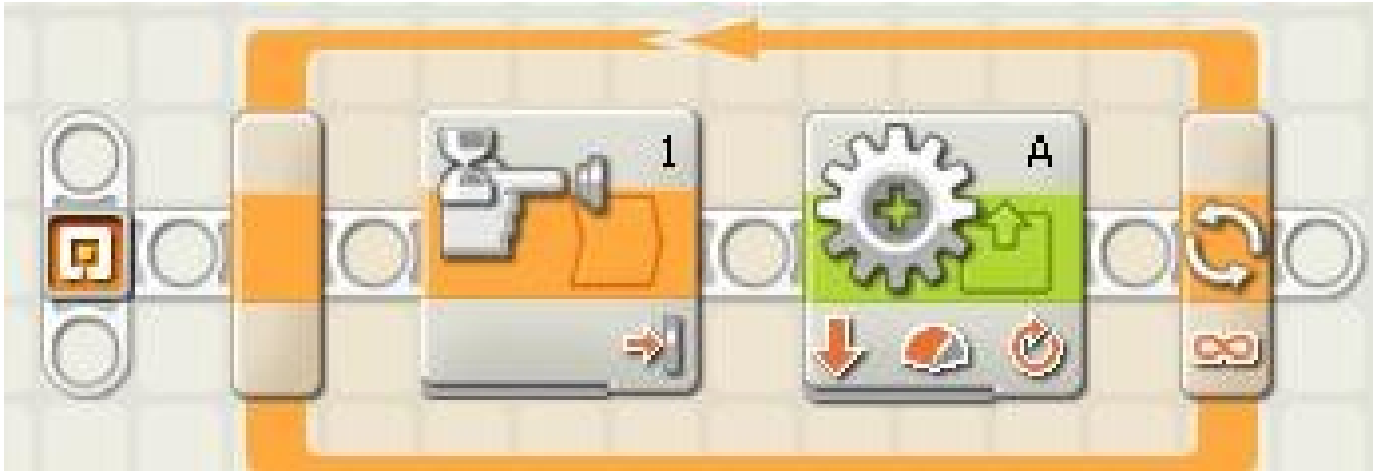


1. _____
2. _____
3. _____

Answer:-

- 1- a touch sensor will cause the program to switch between two row
- 2- The upper blocks will run forward , make sound if the touch sensor is pressed
- 3- The lower block will run backward if the touch sensor is not being pressed.

Q42. What is the main function of the loop block in the program shown?



.....
.....

Answer:-

With loop block the motor run backward forever when touch sensor pressed.

Q43. Write the sound sensor's condition at a specific point in the program.

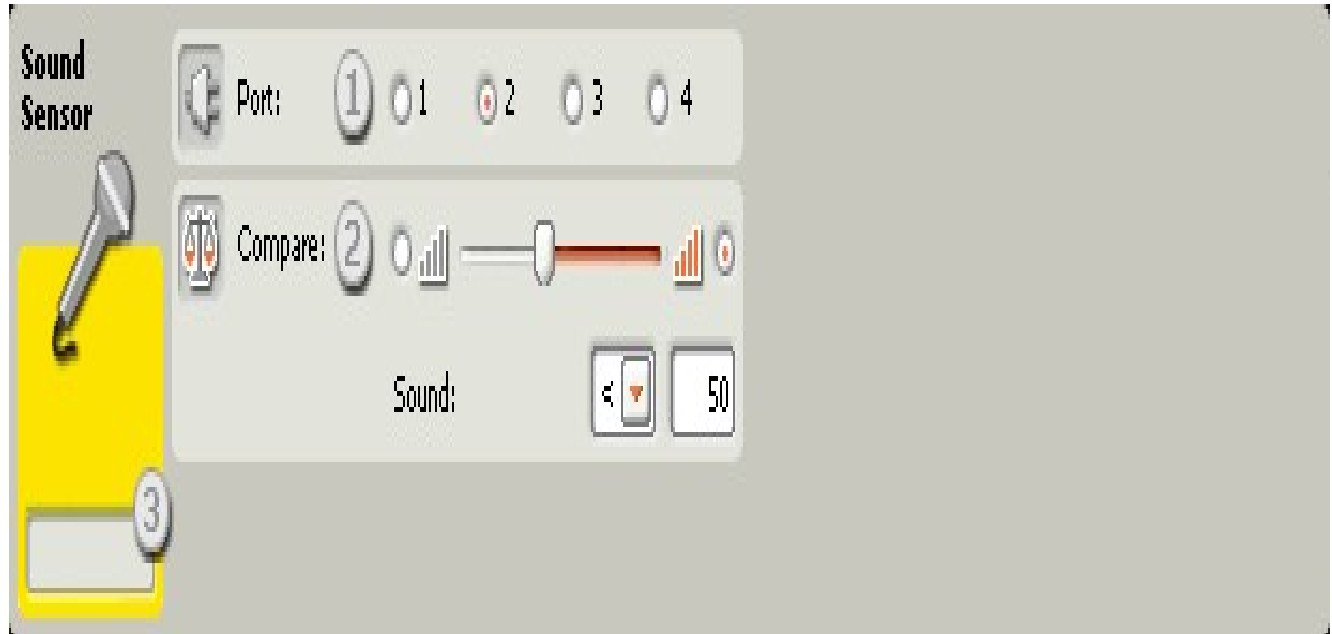


1.
2.
3.

Answer:-

1. MINDSTORMs NXT ports are connected to the touch sensor
2. This icon indicates at what level the trigger point is set.
3. The block's data hub

Q44. For the Configuring sounds Sensor Block write down the names the following:-



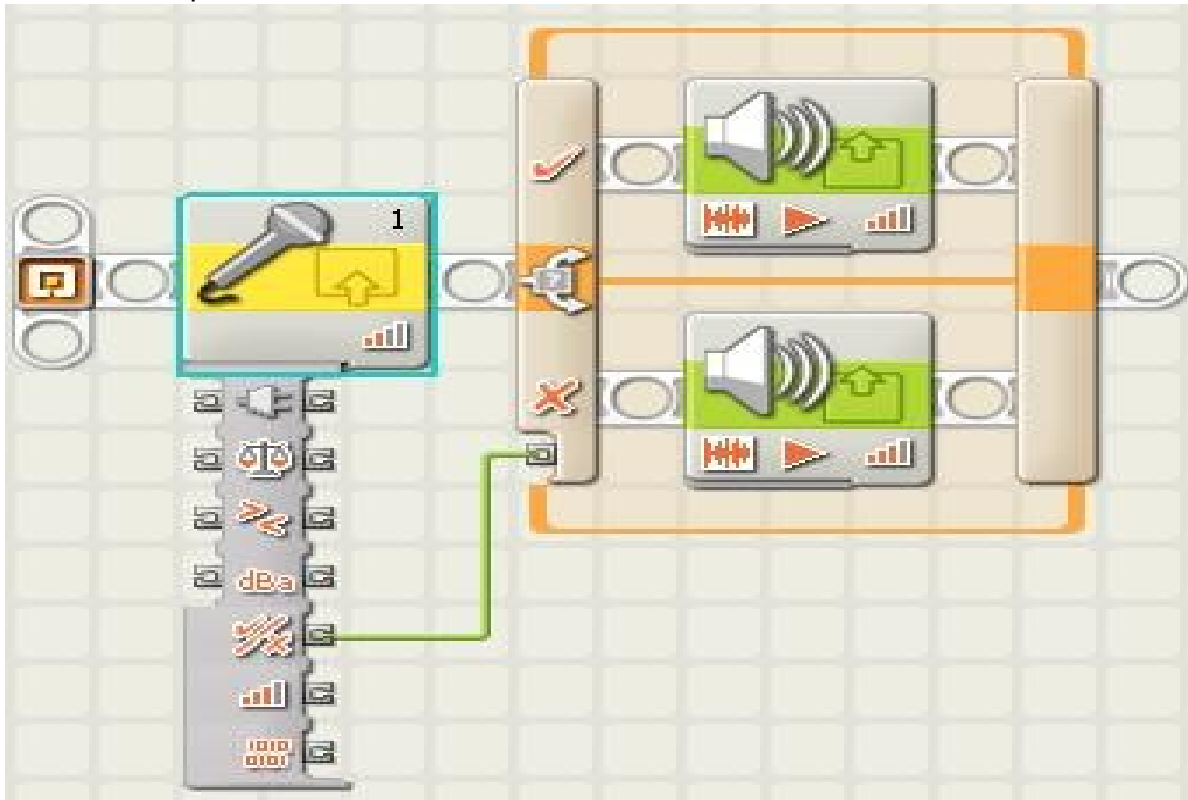
- 1-
- 2-
- 3-

Answer:-

1. the port:- that the touch sensor is connected to
2. the slider to set the trigger value or type a value directly into the input box
3. The feedback box displays the current sound reading (0-100%)

Q45. The program below has the following conditions:-

1- Sound sensor adjust >60. 2- Upper sound block: You're good. 3- Lower sound block: Woops.



Answer the following questions.

a- What happens if the sound generated is higher than 60?

.....

b- What happens if it is less than 60??

.....

c- What is the purpose of wiring in the program?

.....

Answer:-

a. What happens if the sound generated is higher than 60?

The upper sound block activate (You're Good)

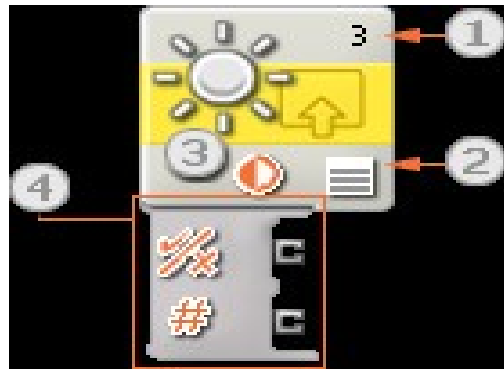
b. What happens if it is less than 60??

The lower sound block activate (Woops)

c. What is the purpose of wiring in the program?

To choose between two code sequences of sound block based on the sound sensor value >60

Q46. Write the light sensor's condition at a specific point in the program



- 1- _____
- 2- _____
- 3- _____
- 4- _____

Answer:-

- 1. MINDSTORMs NXT ports are connected to the light sensor
- 2. This icon indicates at what level the trigger point is set.
- 3. This icon is displayed if "Generated Light" is turned on.
- 4. The block's data hub

Q47. What is the main function of the light sensor?

Answer:-

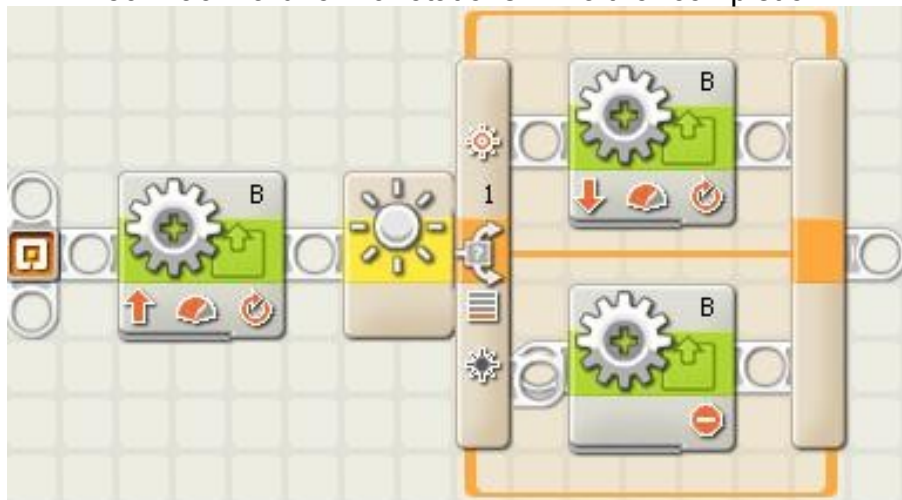
It can read the light intensity in a room and measure the light intensity of colored surfaces

Q48. The program below has the following conditions:-

Runs a motor forward first for 10- rotations – wait for completion.

a. Depending on the light sensor reading :

- i. <50 : Stop the motor.
- ii. >50 : Backward for 10 rotations – wait for completion.



Answer the following questions.

a. What happens if the light generated is higher than 50?

.....
.....

b. What happens if it is less than 50??

.....
.....

Answer:-

a- What happens if the light generated is higher than 50?

Runs a motor forward first for 10- rotations – wait for completion after that
The upper motor block activate (Backward for 10 rotations – wait for completion)

b- What happens if it is less than 50??

Runs a motor forward first for 10- rotations – wait for completion after that
The lower motor block activate (Stop the motor)

Q49. What is calibration?

.....
.....

Answer:-

- Is the process of adjusting a device or a sensor → knowing its standards, limits
and responses

Q50. What is the Sensor Calibration?

.....
.....

Answer:-

is the relationship between input and output for a given measurement.

Q51. How to calibrate your sensor?

.....
.....

Answer:-

A: using Lego MINDSTORMs NXT – feedback box for each sensor you could
calibrate your sensor.

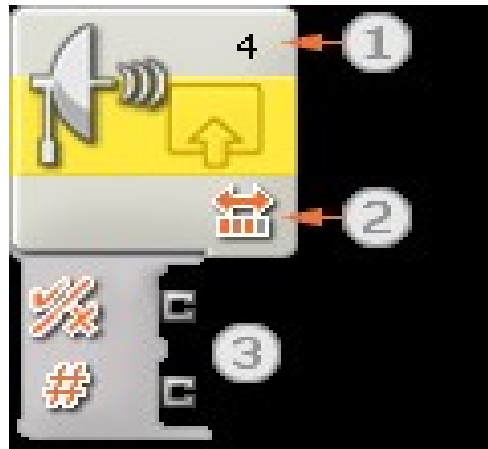
Q52. Why do you need to calibrate or adjust your sensor?

.....
.....

Answer:-

Using the feedback box – monitoring the reading of the sensor by passing it over each of the color used, writing down the values of each color and using it later in your program (you'll do it – one of your tasks).

Q53. Write the ultrasonic sensor's condition at a specific point in the program



1. _____
2. _____
3. _____

Answer:-

1. MINDSTORMS NXT ports are connected to the light sensor
2. This icon shows whether the ultrasonic sensor is set to detect objects nearby or farther away
3. The block's data hub

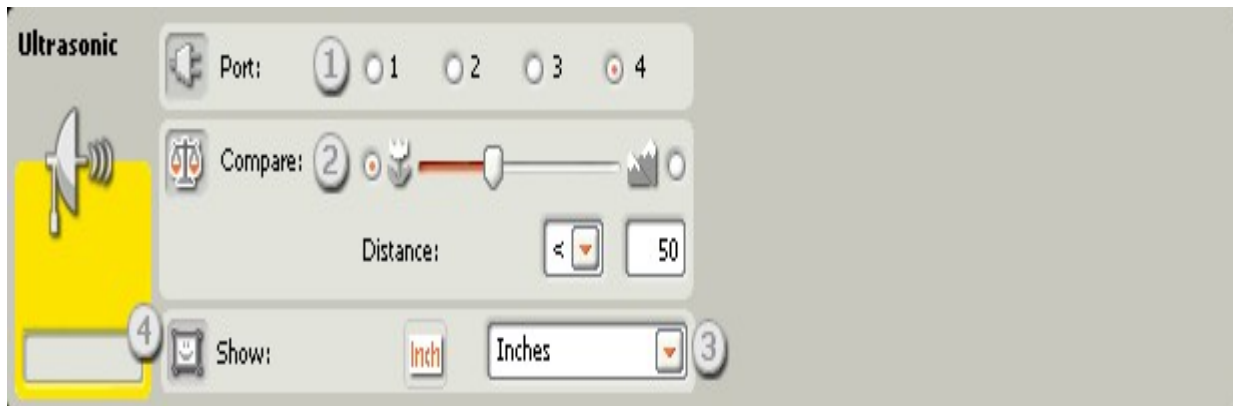
Q54. What is the main function of the ultrasonic sensor?

.....
.....

Answer:-

Measures distance in centimeters and in inch on the NXT
Enables the robot to see and detect objects

Q55. For the Configuring sounds Sensor Block write down the names the following



1.
2.
3.
4.

Answer:-

1. The port: - that the ultrasonic sensor is connected to.
2. The slider to set the trigger distance or type a value directly into the input box.
3. Select to read values in Centimeters or Inches.
4. The feedback box displays the current ultrasonic reading (0-250 cm or 0-100 in).

Q56.state four types of the robot movements?

1.
2.
3.
4.

Answer:-

❖ robot movement could be as follows:

- 1- Forward
- 2- Backward
- 3- Turn Left
- 4- Turn Right
- 5- Rotate
- 6- Dance, etc

Q57. What is the difference between motor and move blocks in function?

Answer:-

Function: where the Motor block is used to control one motor at a time on the other hand the Move block is used to control the movement of 1-3 motors.

Q58. Fill in the blank; choose from the following bracket (Rotations, seconds speed, three, reading.) put the answer in the table attached.

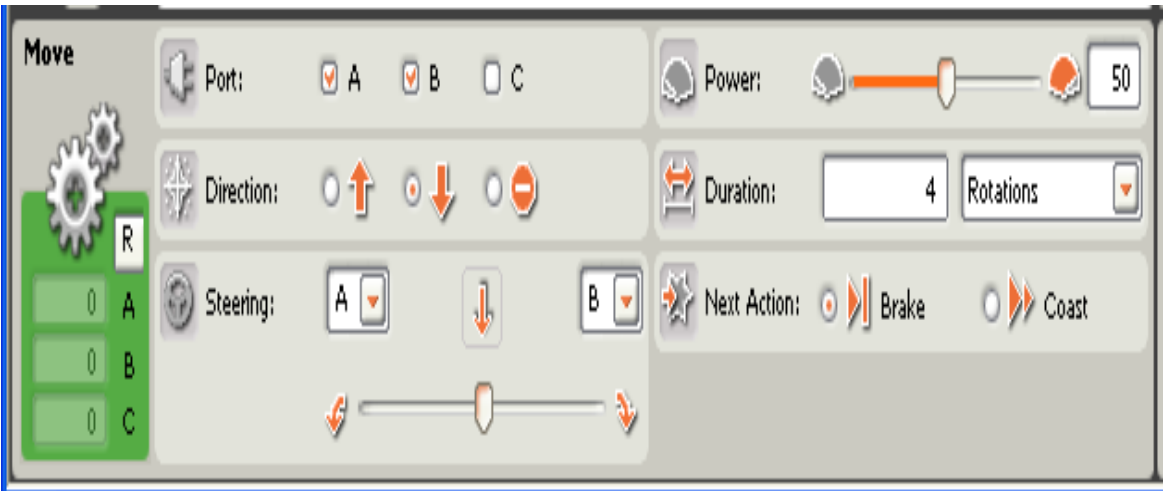
- 1. The power level in motor block is the indication to the -----of the motor.
- 2. The function of the duration property to control the duration of the motor as unlimited, degrees -----, and-----.
- 3. Lego MINDSTORMs NXT has----- palettes with icons used in programming:

Question	1	2	3
Answer			

Answer:-

Question	1	2	3
Answer	speed	Rotations, seconds	three

Q59. In the Move Block Configuration shown write (T) for true and (F) for false in the following table



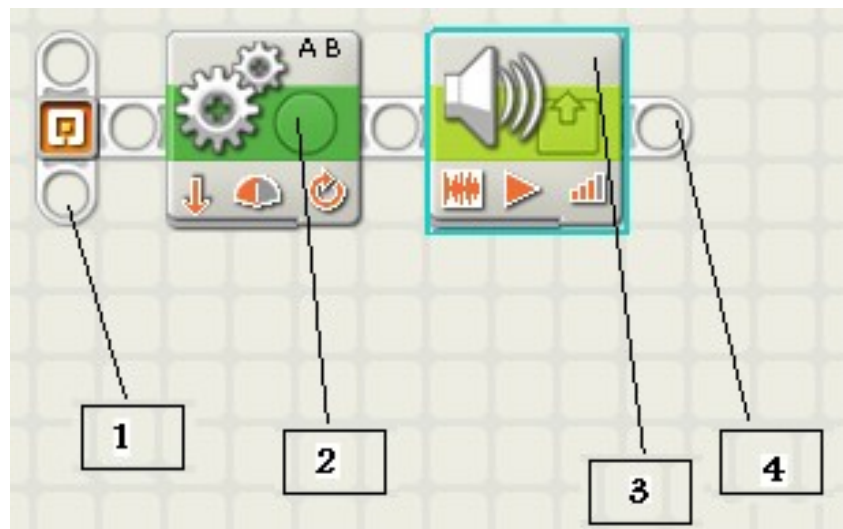
1. The motors (A) move backwards and the following step the motors (B) move backwards after with the same power.
2. This slider and the editable input box indicate that the setting power level [50%] for the motors (A&B) at the same time.
3. The Duration pull-down menu, indicate that the setting motors to run for a rotations for a set number 4.
4. The motors will brake and coast after they've finished their action.
5. The feedback boxes will count how many full rotations your motors turn

Question	1	2	3	4	5
Answer					

Answer:-

Question	1	2	3	4	5
Answer	F	T	T	F	T

Q60. Name the following drawing



- 1- _____
- 2- _____
- 3- _____
- 4- _____

Answer:-

- 1- Start point
- 2- Move block
- 3- Sound block
- 4- Sequence beam

Q5. Define the sequence beams in the MINDSTORMS NXT?

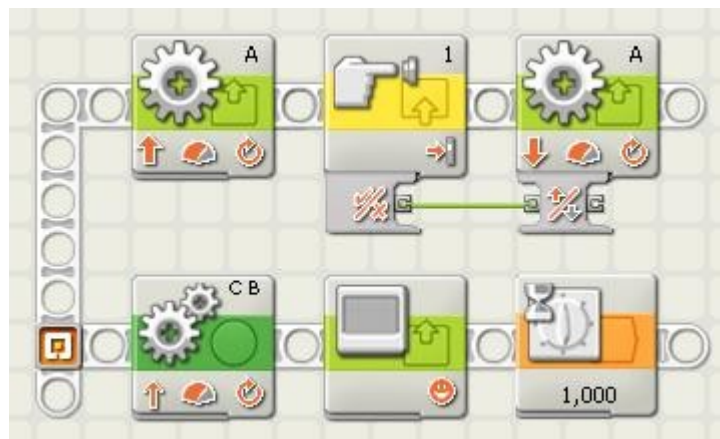
Answer:-

The sequence beam controls the flow of your program.

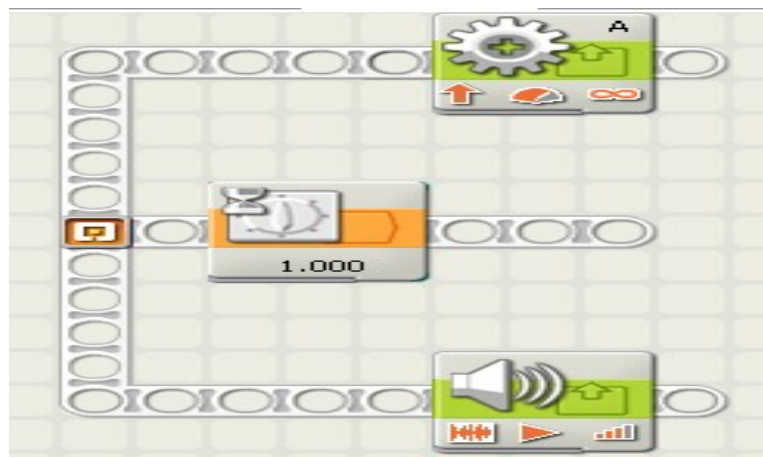
It indicates the sequence in which programming blocks will run

Q61. In the program shown the two lines of sequence beam will run -----

- a. In sequence from the first line to the second line
- b. Simultaneous
- c. Motors C&B only
- d. Motors A only



Q62. See the figure below.



1- What does parallel sequence beams indicate?

.....
.....

Answer:-

Motor run forward, wait for one second, sound file

2- Which one will be executed first??

.....
.....

Answer:-

All at same time

Q63. If you want to let the robot turn left until it approaches its starting point, how many degrees should be assigned in configuration panel for duration?

.....360.....

Q64. If you want to use rotations instead of degrees what should you assign your rotations to be? (Circle the correct answer)

- a- 2 rotations
- b- 1 rotation
- c- 0.25 rotation
- d- 0.5 rotation

Q65. Follow the configurations assigned in the table below and fill the table with your robot action.

Direction	Steering	Robot movement (left or right ,rotate, straight line)
Forward		
Backward		
Forward		
Backward		
Forward		
Backward		
Forward		
Backward		
Forward		
Backward		

Answer:-

Direction	Steering	Robot movement (left or right ,rotate, straight line)
Forward		<u>Straight-line</u>
Backward		<u>Straight-line</u>
Forward		<u>Right</u>
Backward		<u>Right</u>
Forward		<u>Rotate C.W</u>
Backward		<u>Rotate C.W</u>
Forward		<u>left Forward</u>
Backward		<u>left Backward</u>
Forward		<u>Rotate C.C.W</u>
Backward		<u>Rotate C.C.W</u>

Q66. What is the difference between the Move block & the Motor block?

.....

Answer:-

Function: where the Motor block is used to control one motor at a time on the other hand the Move block is used to control the movement of 1-3 motors.

View: the Motor block has one gear on its icon but the Move block has 2 gears on its icon.

Q67. What is the use of steering in the Move block configuration?

.....
.....
.....

Answer:-

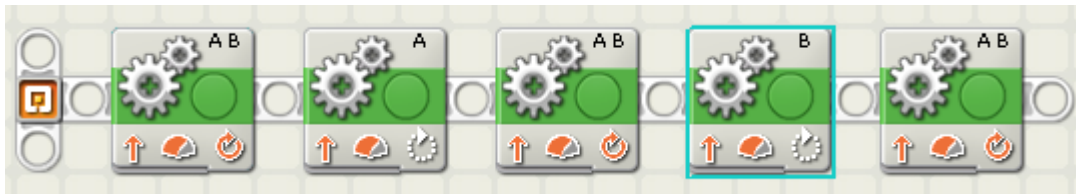
The Steering slider will appear with the chosen port letters indicated at each side. Move the slider to set a curved path for your robot. With the slider all the way to either side, your vehicle will spin in place.

Q68. The program below has the following conditions:-

1. motor A&B Forward – 2 rotations
2. motor A 90 degree
3. motor A&B Forward – 2 rotations
4. motor B 180 degree
5. motor A&B forward – 2 rotations

Describe the program shown?

.....
.....
.....



Answer:-

Forward robot – 2 rotations, Turn robot Right, Forward robot – 2 rotations, Turn robot left, forward robot – 2 rotations

Q69. Write three examples of how we use sensors to controlled Robot Movements

1. -----
2. -----
3. -----

Answer:-

- 1- Control the robot to follow a path of a dark line – using light sensor.
- 2- Control the robot direction by reversing it if it faces an obstacle using a touch sensor or an ultrasonic Sensor.
- 3- Ask the robot to do a certain movement or task if it hears a certain voice using a sound sensor.

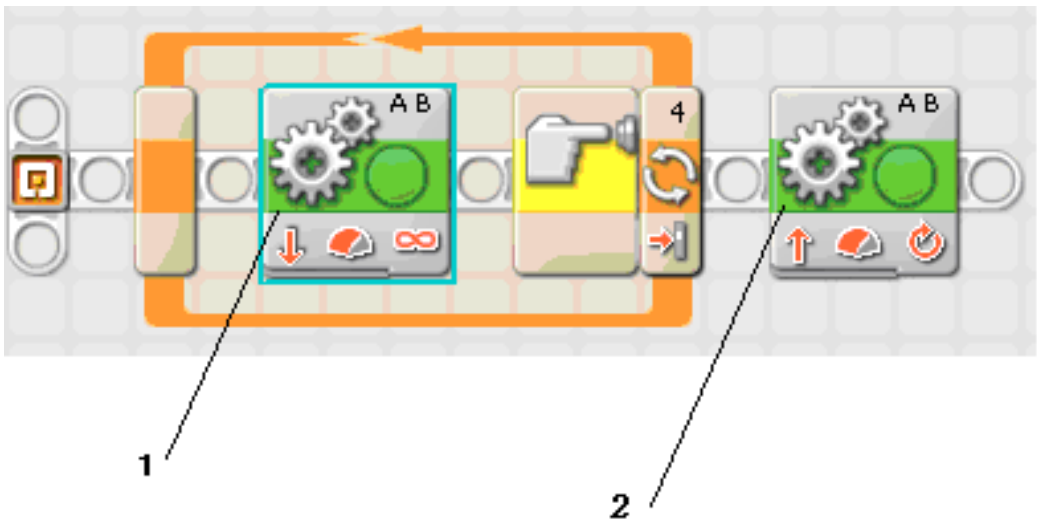
Q70. Write five examples of Robot Movements.

- 1- _____
- 2- _____
- 3- _____
- 4- _____
- 5- _____

Answer:-

- 1. Forward
- 2. Backward
- 3. Turn Left
- 4. Turn Right
- 5. Rotate
- 6. Dance, etc

Q71. In program shown in the figure below write down your configuration parameters. (Fill in the table.)



	Move block –1	Move block --2
Direction		
Duration		
steering		

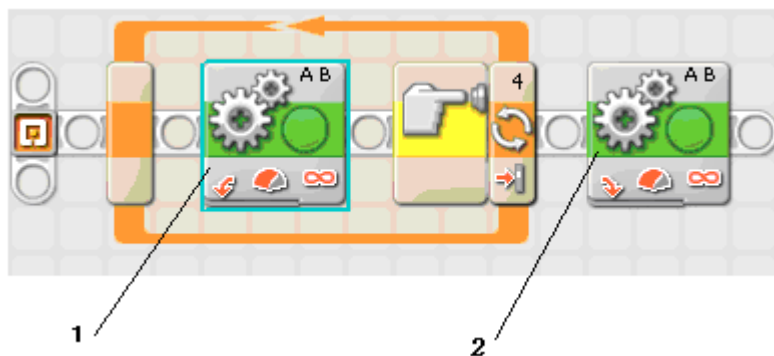
	Loop block
Control	
Sensor	
Action	

Answer:-

	Move block –1	Move block --2
Direction	Backward	Forward
Duration	Unlimited	Rotation
steering	Straight	Straight

	Loop block
Control	Sensor
Sensor	Touch sensor
Action	Pressed

Q72. In program shown in the figure below write down your configuration parameters. (Fill in the table.)



	Move block –1	Move block --2
Direction		
Duration		
steering		

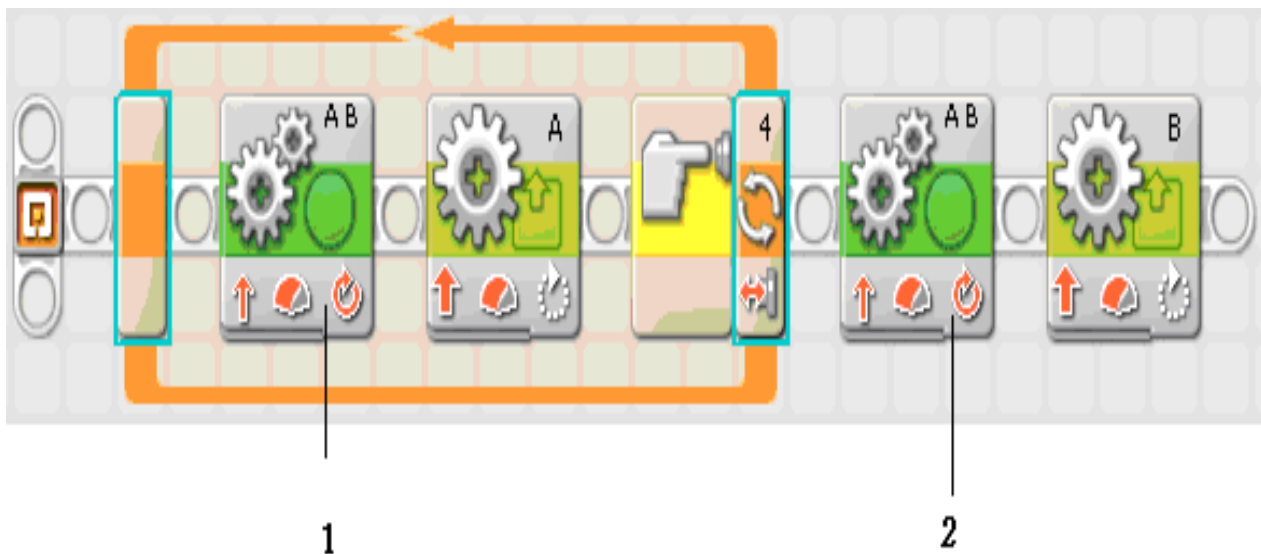
	Loop block
Control	
Sensor	
Action	

Answer:-

	Move block -1	Move block --2
Direction	Backward	Forward
Duration	Unlimited	Rotation
steering	Rotate C.C.W	Rotate C.W

	Loop block
Control	Sensor
Sensor	Touch sensor
Action	Pressed

Q73. In program shown in the figure below write down your configuration parameters. (Fill in the table.)



	Move block -1	Move block --2
Direction		
Duration		
steering		

	Loop block
Control	
Sensor	
Action	

Block	Motor -A	Motor -B
Direction		
Duration		

Answer:-

	Move block –1	Move block --2
Direction	Forward	Forward
Duration	Rotation	Rotation
steering	Straight	Straight

	Loop block
Control	Sensor
Sensor	Touch sensor
Action	bumped

Block	Motor –A	Motor -B
Direction	Forward	Forward
Duration	Degree	Degree

Q74. Fill in the blanket the following by chosen from the packet (listen, analogue, measure, number values). Use the table below

- 1- Sound sensors give the robot the ability to----- and interact to different sounds.
- 2- Sensors are devices that are used to----- things like temperature, light intensity, touch and so on.
- 3- The sound sensor is a device that measures the sound level in the area. It does this by associating -----
- 4- The touch sensor is consider digital sensor but the sound sensor is -----

Questions	1	2	3	4
Answer				

Answer:-

Questions	1	2	3	4
Answer	listen	measure	number values	analogue

Q75. Define the threshold value for the sound value?

Answer:-

A sound "threshold" is a cutoff point that divides all sound values into two possible categories, "Soft" or "Loud." So instead of dealing with 100 different cases

Q76. What the threshold value is used for?

Answer:-

Example of threshold in Student grades:

Threshold value: 90%

What it represents: Student grade

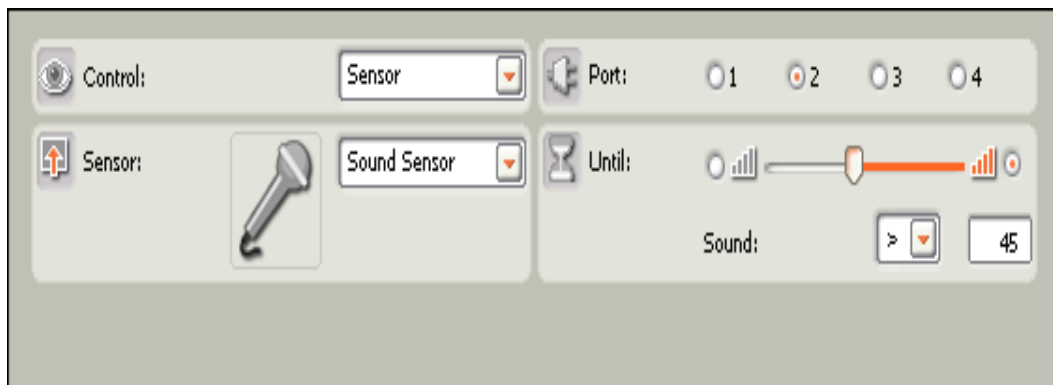
Q77. Given Quiet value = 6, Clap value = 70 calculate the threshold value

Answer:-

$$\text{Threshold_value} = \frac{\text{clap_value} + \text{quiet_value}}{2}$$

$$\text{Threshold_value} = \frac{\text{clap_value} + \text{quiet_value}}{2} = \frac{70 + 6}{2} = 38$$

Q78. Write down the threshold value from the wait block properties and the type of condition.



Answer:-

- Threshold value: 45%

Q79. For clapping which kind of Sensor do you need to use??

.....
.....

Answer:-

.....sound sensor

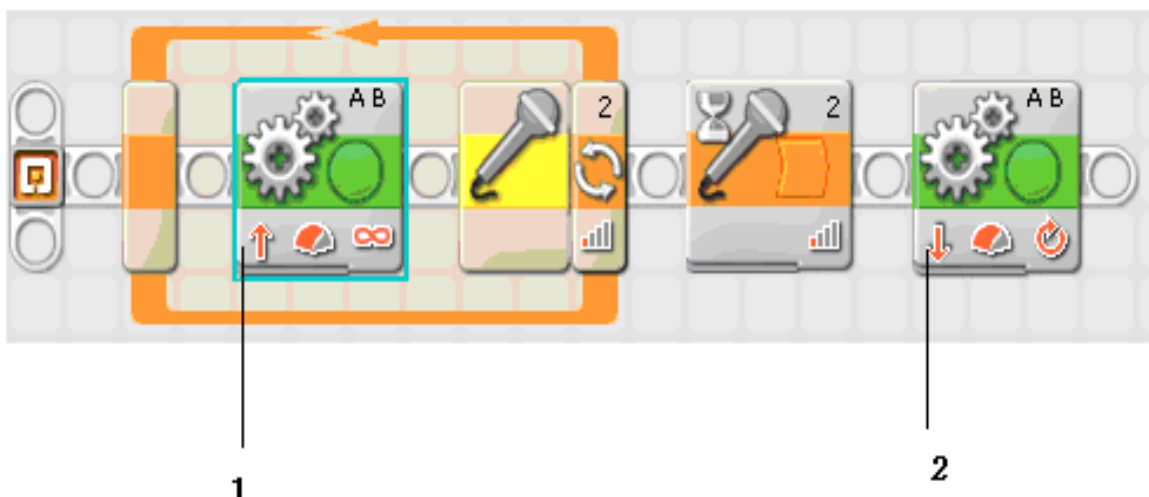
Q80. Define the term: Threshold?

.....
.....
.....

Answer:-

A sound "threshold" is a cutoff point that divides all sound values into two possible categories, "Soft" or "Loud." So instead of dealing with 100 different cases

Q81. In program shown in the figure below write down your configuration parameters. (Fill in the table.)



	Move block –1	Move block --2
Direction		
Duration		
steering		

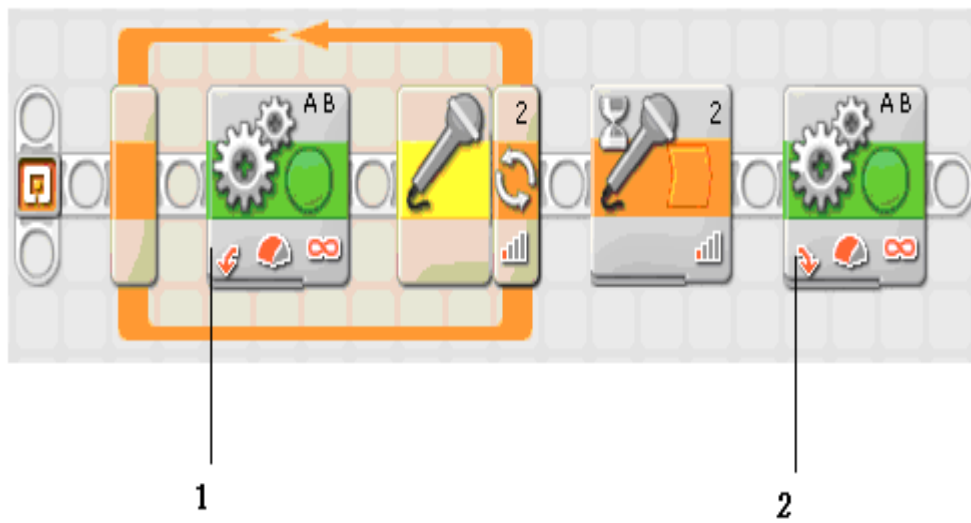
	Loop	wait
Control		
Sensor		
Action		
Until < or >		

Answer:-

	Move block –1	Move block --2
Direction	Forward	Backward
Duration	Unlimited	Rotation
steering	Straight	Straight

	Loop	wait
Control	Sensor	Sensor
Sensor	Sound sensor	Sound sensor
Action		
Until < or >	>trigger value	>trigger value

Q82. In program shown in the figure below write down your configuration parameters. (Fill in the table.)



	Move block -1	Move block --2
Direction		
Duration		
steering		

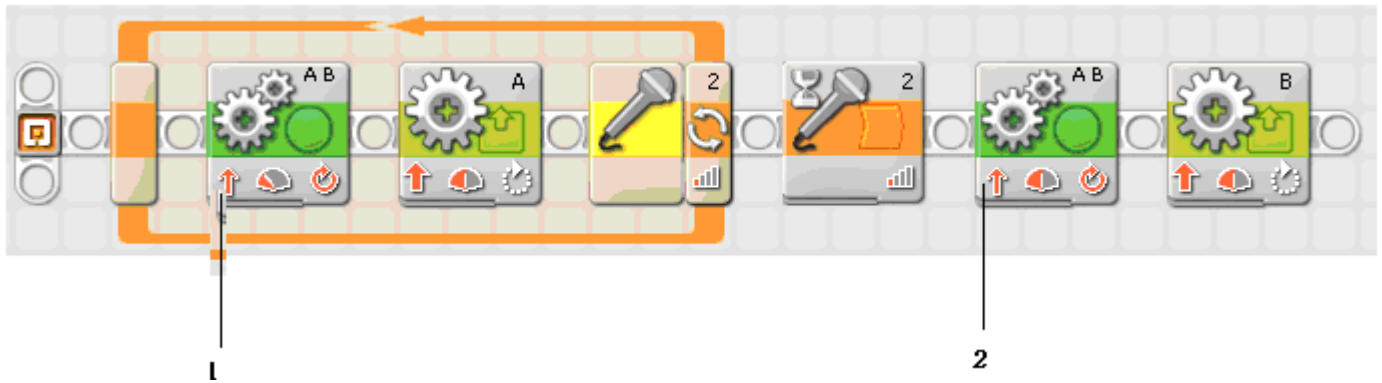
	Loop	wait
Control		
Sensor		
Action		
Until < or >		

Answer:-

	Move block -1	Move block --2
Direction	Forward	Backward
Duration	Unlimited	Rotation
steering	Rotate C.C.W	Rotate C.W

	Loop	wait
Control	Sensor	Sensor
Sensor	Sound sensor	Sound sensor
Action		
Until < or >	>trigger value	>trigger value

Q83. In program shown in the figure below write down your configuration parameters. Fill in the table.



	Move block -1	Move block --2
Direction		
Duration		
steering		

	Loop	wait
Control		
Sensor		
Action		
Until < or >		

Block	Motor -A	Motor -B
Direction		
Duration		

Answer:-

	Move block -1	Move block --2
Direction	Forward	Backward
Duration	Unlimited	Rotation
steering	Rotate C.C.W	Rotate C.W

	Loop	wait
Control	Sensor	Sensor
Sensor	Sound sensor	Sound sensor
Action		
Until < or >	>trigger value	>trigger value

Block	Motor -A	Motor -B
Direction	Forward	Forward
Duration	Degree	Rotation